EPA's Green Programs

BUILDINGS, with the support of the U.S. Environmental Protection Agency (EPA), presents the latest update to — and chronicles end-users' successes in — the organization's extensive green programs, including Green Lights, ENERGY STAR Buildings, ENERGY STAR Transformers, and ENERGY STAR Office Products.

By Julie Eisele, Contributing Editor

Green Lights: Lighting the Path to Success

In its fifth year of remarkable success, the U.S. Environmental Protection Agency's (EPA) Green Lights program has reached a significant milestone: More than 2,000 organizations — representing more than 5 billion square feet of U.S. office space (or the equivalent of one in 14 office buildings) — have committed to the undertaking.

Of that 2,000, about 37 percent are *Fortune 500* companies. In addition to these companies, Partners include schools, governments on all levels, nonprofit groups, small businesses, healthcare facilities, and organizations that agree to survey all U.S. facilities and upgrade 90 percent of their lighting, where profitable, within five years.

Green Lights helps to fulfill the goals of the Climate Change Action Plan, introduced by the Clinton Administration in an effort to address global warming by reducing pollution. The program has spread the word that millions of dollars — and tons of pollution — can be saved through energy-efficient lighting. Hundreds of organizations have already finished their upgrades, and others are in the early stages of implementation. Together, they have already cut $172 million in electricity costs, according to the EPA. And the most recent figures show a 3.4 billion pound reduction of harmful pollutants since Green Lights' inception.

Green Lights has caught many executives off guard because the words "upgrade" and "profit" seem contradictory (and understandably so). However, the experiences of Green Lights' customers are compelling. Figures show that upgrades with energy-efficient lighting products cut lighting energy use, on average, by 50 percent. Furthermore, the average internal rate of return is about 40 percent.

Those figures explain the effort's popularity, says Maria Tikoff, EPA director for the Green Lights program. "The success of Green Lights proves that voluntary programs work. Employers save money, employees and customers experience an enhanced working environment, and pollution is prevented," she says. Adds Rick White, EPA national marketing director for the Green Lights and ENERGY STAR Buildings programs: "It's a win-win situation — there are no negatives. You save money and you prevent pollution."

Here's how the program works. Partners who agree to perform upgrades wherever profitable (and where quality is maintained or enhanced) sign a Memorandum of Understanding (MOU), committing upgrades to include 90 percent of their facilities within five years.

The EPA provides a host of support tools and services, including a customer support person to help plan and schedule upgrades; educational videos and implementation workshops; the EPA's *Lighting Upgrade Manual*; a hotline for questions (which received more than 13,000 calls in a recent 1-year period); and several software tools for tracking implementation, lighting and energy savings, and internal rate of return. "We also offer advice on financing options, technology applications, and how to make Green Lights happen in organizations large and small," says Tikoff.

Examples of widely used technologies include electronic ballasts, which regulate the amount of energy needed to light and maintain a fixture; T-8 lamps, which give off more light per watt than conventional T-12 lamps; occupancy sensors that turn lights off after a space becomes unoccupied; reflectors, offering mirror-like features that reflect light downward; and compact fluorescents, which

last roughly 10 times longer than incandescent lights, and are more effective.

Green Lights encourages organizations to take a holistic approach to their lighting systems. One major goal of the program is to help organizations understand that energy-efficient technologies are smart investments. "Many of these energy-efficient technologies have been around for some time — T-8 lamps and electronic ballasts, for instance. These are now becoming standard," says Tikoff, who also lauds lighting equipment manufacturers for their efforts to produce more efficient products. Almost all manufacturers are Green Lights Allies. Like Partners, Allies agree to upgrade their own facilities' lighting, but also work with the EPA to promote energy-saving technologies. In addition to manufacturers, Allies include electric utility companies, lighting management companies, lighting distributors, and lighting surveyors.

Green Lights has paid off in countless ways for its participants — and for the environment. Its huge success has paved the way for the ENERGY STAR Buildings program. This effort is designed to build on the savings made through Green Lights, seeking additional ways to reduce building energy use up to 50 percent. Through this, the ENERGY STAR Buildings program hopes to save $28 billion in electricity costs by the year 2000. It has also raised the visibility of other EPA voluntary green programs aimed at pollution reduction. ▶

Lighting Upgrades Brighten Bottom Lines

Companies across the United States are offering compelling testimony about the success of the Green Lights program.

Total savings garnered by New Brunswick, NJ-based Johnson & Johnson (J & J), for example, have stacked up to $3.55 million per year. Ethicon Endo-Surgery, Inc., a J & J subsidiary, has slashed $68,000 from its annual lighting bill at a 303,000 square foot product development/manufacturing facility in Cincinnati, according to Joe Butchko, staff engineer with the company's Corporate Facilities Engineering and Construction Group. This resulted in the prevention of more than 2 million pounds of such pollutants as carbon dioxide, sulfur dioxide, and nitrous oxide.

Across the country in Albuquerque, another Ethicon Endo-Surgery facility with more than 200,000 square feet will see an estimated $32,000 savings per year — or more. The Green Lights upgrade was completed in September; a 4-month period has already yielded a savings of $18,000.

At that facility, Plant Engineer Senaka Nanayakkara is overseeing the building's progression from Green Lights into the ENERGY STAR Buildings program. "It's a logical extension of the Green Lights program," he says. That program involves a 5-step upgrade process. "We are currently working on the variable frequency drives and energy-efficient motors," says Nanayakkara.

Ethicon Endo-Surgery was recognized by J & J as the first multi-site company to achieve 100 percent completion of Green Lights upgrades, says Nanayakkara.

J & J's commitment to the EPA's voluntary green programs makes it possible for its subsidiaries — both domestic and international — to achieve high energy-saving results, say Nanayakkara and Butchko. "J & J's company credo states that we 'must protect the environment and our natural resources.' And, in reality, if it's good for the environment, it's going to be good for our company," says Butchko. Indeed, J & J was recognized by the EPA as Large Corporation Partner of the Year in 1995, acknowledged for outstanding environmental leadership.

At Lima Memorial Hospital (pictured), Lima, OH, Facilities Manager Don Vershum jumped at the chance to join the Green Lights program. "I was a big proponent," he says. The hospital was also honored by the EPA as Small Hospital Partner of the Year in 1995.

A lighting audit determined a retrofit would save the hospital and three adjacent buildings more than $60,000 per year. Actual savings for the 475,000 square foot complex, however, have been even higher than that, according to Vershum.

The hospital's lighting overhaul included installation of T-8 lamps, electronic ballasts, placement of reflectors where possible (eliminating 50 percent of existing lights), and incorporation of about 50 motion sensors. Exit signs were also revamped with LED technology. "It was a major undertaking," says Vershum.

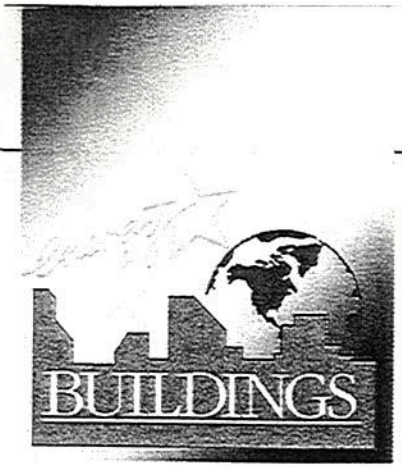
Still, his enthusiasm remains vital: He hopes to eventually pursue the hospital's participation in the ENERGY STAR Buildings program.

Saving Big

Green Lights upgrade projects* have resulted in significant savings for several companies:

Company	Savings
Amoco, Tulsa Research Center, Tulsa, OK	3.2 million kWh/year $225,050/year
Bell Atlantic, Richmond Data Center, Richmond, VA	1.6 million kWh/year $109,000/year
Boeing Commercial Airplane Group, Renton Div., Renton, WA	10.6 million kWh/year $360,506/year
Compaq Computers, Houston Facility, Houston, TX	1.3 million kWh/year $83,493/year

*Companies employed a variety of technologies, some of which included installation of fluorescent fixtures, T-8 lamps, electronic ballasts, and dimming systems.



ENERGY STAR Buildings: Showcasing Success

Voluntary green programs offered by the EPA to facilities managers across the country seem to define common sense. That is, they enable building owners and operators to upgrade facilities with the latest technology — and actually save money, as well as energy.

The outcome of the EPA's ENERGY STAR *Showcase* Buildings program has yielded profitable, pollution-preventing results. Twenty-four organizations took part in the *Showcase* pilot program, agreeing to undertake a comprehensive, building-wide upgrade within one year; participants reported an amazing 35 percent energy savings per year, on average. That translates into an average yearly savings of 61 cents per square foot, says Jean Lupinacci, director of the ENERGY STAR programs.

The EPA estimates that ENERGY STAR Buildings could save a potential $28 billion in electricity costs by the year 2000 if all the commercial space in the country joined the program. That's a significant clip, considering that it costs $70 billion per year to operate commercial and industrial buildings.

The pilot cleared the way for — and serves as a model to — the ENERGY STAR Buildings program, which took off in April 1995. Armed with concrete cost savings and pollution-prevention data from the *Showcase* effort, the EPA has since attracted more than 70 participants. Having solid facts and figures from real building scenarios has been effective in the EPA's efforts to reach decision-makers, says Lupinacci. "The ENERGY STAR *Showcase* Buildings program was very important in helping us verify savings."

Program participants commit to a 5-step implementation process designed to achieve optimal energy savings. Those steps include:

1) *Green Lights,* the Atmospheric Pollution Prevention Division's flagship green program that promotes the use of energy-efficient products to reduce lighting energy consumption. (Green Lights participants may sign an addendum to their current Memorandum of Understanding to join the ENERGY STAR Buildings program, while new participants may join ENERGY STAR Buildings directly.);

2) *Building Tune-Up;*

3) *HVAC Load Reduction;*

4) *Improved Fans and Air-Handling Systems;* and

5) *Improved Heating and Cooling Plant.*

The staged approach promotes effective load matching when major equipment replacements (such as chillers) are made in the final phases of building upgrades.

Participants agree to survey all U.S. buildings they own or control financially; they then focus on one building for the first — or pilot — upgrade. This allows Partners to become comfortable with the staged approach before applying it to all other building upgrades.

The success of the pilot *Showcase* has facilitated the program's full-scale launch, and the number of ENERGY STAR Buildings participants is growing. "We believe that seeing early success will lead people to want to do even more. Once they see there are documented savings, and that the technology is not exotic, they become more confident," says Lupinacci. *Showcase* participants selected a wide variety of technologies. "There was no 'pat' approach," she notes.

In addition to energy- and dollar-savings projections, the kick-off program provided some valuable insight for ENERGY STAR Buildings. For example, program officials learned that energy use in many buildings goes largely unmonitored, and they found monitoring to be a low-cost method for targeting wasted energy (and money). The importance of effective organization, on the part of participants, was also underscored.

In response to participants' organizational needs, the EPA has created a software program that maps out a 7-year approach to building upgrades. The tool, known as Scheduler, is offered as part of the EPA's technical support to participants, helping to plan specific steps, outline budgeting needs, and track success. "We learned that, in order to have a successful project, it needs to be effectively planned, budgeted, and scheduled," says Lupinacci.

Along with ENERGY STAR Buildings program participants, who represent office buildings, hospitals, universities, and industry, EPA officials know the importance of timetables. The Atmospheric Pollution Prevention Division aims to reduce 46 million metric tons of harmful pollutants by the year 2000. At the current rate of its success, that target is right on track.

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Showcase: St. Charles Medical Center

Across the United States, the practice of healthcare is affected each day by efforts to temper skyrocketing costs. For patients and doctors, that often means managed care. For hospitals, it means closer attention to expenditures — a directive not lost on facilities managers.

At St. Charles Medical Center, a regional tertiary facility in Bend, OR, Facilities and Technical Services Director Mike Severns saw the EPA's ENERGY STAR Buildings program as a great opportunity. "We run 24 hours per day, seven days per week, 365 days per year. We never shut down," he says. "Efficient operations — that's what [ENERGY STAR] is all about."

Officials at St. Charles, the only hospital among the 24 participants in the *Showcase* program, had participated in the Green Lights effort. As a result of tremendous savings from that program, the organization's interest in the *Showcase* venture was piqued. The 330,000 square foot, 181-bed facility was built in 1975, with several additions made during the past two decades, making it a good choice for technological upgrades.

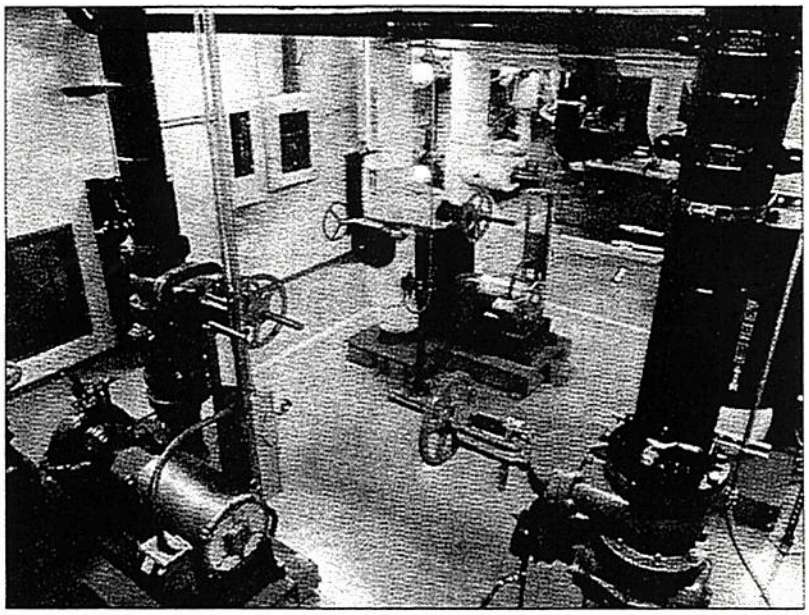
Those upgrades paid off to the tune of $165,000 in power savings annually — 30 percent of the hospital's typical utilities bill. Working with a third party that offered a performance guarantee, the hospital is assured of saving that amount each year. "But we are actually noticing more than that," notes Severns. Total kWh savings is about 3.4 million per year, in addition to natural gas savings.

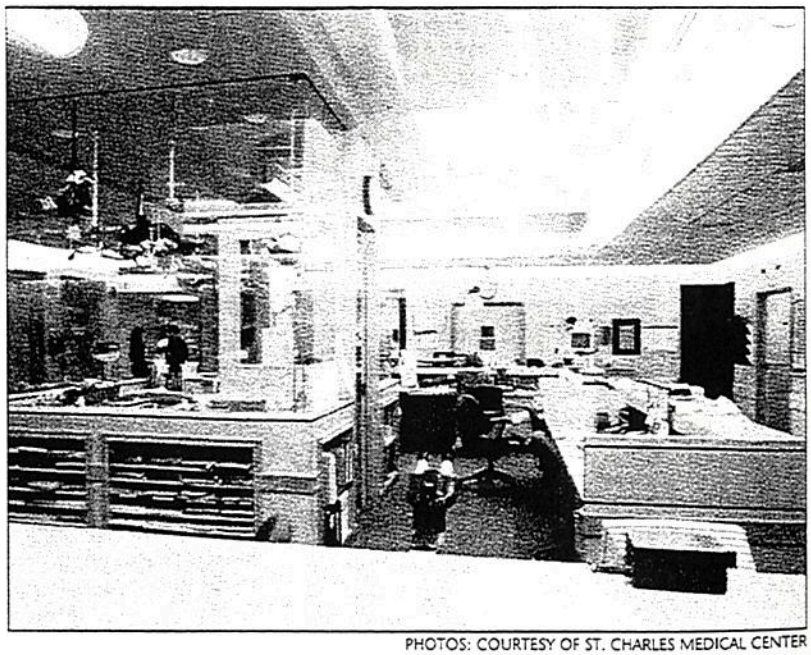
The medical center was recognized by the EPA for being the most comprehensive *Showcase* project — and it's no wonder, considering all the technological enhancements. In addition to installing energy-efficient lighting and ballasts, occupancy sensors were placed throughout the building.

Incorporation of variable air volume (VAV) systems and energy-efficient motors also yielded high savings. "Before, all of our [air-handling] systems were at constant velocity. Being sensitive to changes and requirements for healthcare, we went through and installed high-efficiency motors and variable speed drives on every system," says Severns. Occupancy sensors now "bring building systems to life," he notes. For example, operating suites at the hospital are rarely used on weekends. However, if a suite is needed and staff enters the area, occupancy sensors activate all necessary building systems.

A new chiller using hydrochlorofluorocarbon (HCFC)-123 was installed to replace a less efficient chiller that used R-11, one of the CFC-based refrigerants no longer manufactured since Jan. 1. The new chiller includes a heat recovery feature; heat generated by the machine is captured and reused. A key player in the facility's significant savings, says Severns, is the building automation system. "It samples and adjusts this building every 10 seconds," he adds. It also offers warnings about potential problems — dirty filters within fan systems, for example — before employees or patients are ever affected.

The St. Charles project, financed partly with a $615,000 rebate from the Bonneville Power Administration in Washington state, has become a "showcase" in the truest sense. Officials from other hospitals have toured the facility to learn about lowering operating costs. In fact, Severns plans to work with six smaller hospitals that are part of the Central Oregon Hospitals Network, which collaborates with St. Charles and transfers more critical patients to the Bend facility. "Hospitals have to become very efficient organizations that operate at the lowest possible cost," he says. ▶





PHOTOS: COURTESY OF ST. CHARLES MEDICAL CENTER

At St. Charles Medical Center, building systems are monitored by automated controls (top photo). Lighting upgrades (lower photo) have enhanced color renderings throughout the hospital.

Showcase: The Trane Co.

When the EPA announced its ENERGY STAR Buildings *Showcase* program, promoting the endeavor as both environmentally and financially sound, officials at The Trane Co., a LaCrosse, WI-based manufacturer of HVAC equipment and controls, took immediate notice.

Trane had been an active participant of the Green Lights program, and taking the concept even further appealed to company officials. ENERGY STAR appeared to be a smart business move that helped mitigate environmental concerns — too good to pass up.

In fact, as a result of the Trane Technology Center's upgrade, the company reports a decrease of about $60,000 in energy costs. That estimate reflects just one year, and actual savings figures related to upgrades will become more accurate as time passes, says Trane Facility Engineer Robert Roach (pictured), who oversaw the ENERGY STAR enhancement.

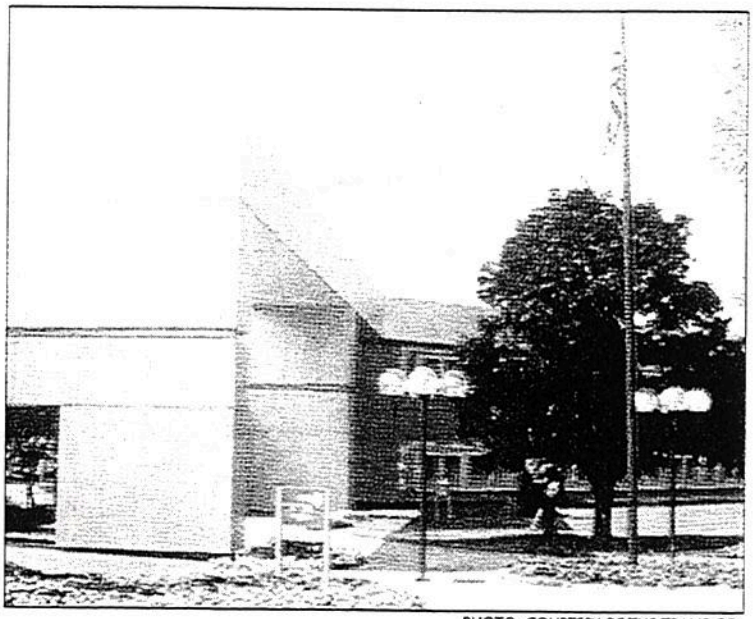
Because the facility was only about a decade old when the program began, some of the technologies promoted by ENERGY STAR were already in place, such as variable air volume (VAV) systems. Power-pinching modifications included a lighting retrofit, building tune-up, and improvements to the heating/cooling plant.

Roach estimates the first and last steps contributed largely to the savings. "I would guess that the lighting upgrade saved the most money for us, mainly because lighting is used 12 months per year. You use it every day, all year long." Changes made to the heating/cooling plant included a variable frequency drive system placed on one of the chillers. "We are going to see tremendous kilowatt-per-ton ratings, as a result," Roach says. "Ratings are less than 0.3 kW per ton at part-load, and at 0.49 kW per ton at full-load."

Naturally, the company used Trane EarthWise™ chillers for the project. Roach estimates that savings from the highly efficient units would be even more recognizable if the company was based in a warmer climate. "Chillers in southern climates have an even greater number of hours of operation," he notes.

Trane officials say the program's internal rate of return was over 20 percent. The company will continue to evaluate its facilities, on a case by case basis, for potential energy enhancements. ▶

Company officials speak highly of the EPA's efforts to spread the word about the crucial partnership between energy (and cost) savings, and pollution reduction. "The ENERGY STAR Buildings program is a great way to communicate the message that you can be investment smart and environmentally smart," says Gene Smithart, director of Environmental Affairs at Trane. "The ENERGY STAR Buildings program's message that you can be both business-wise and earth-wise is important for building owners to internalize."



Top photo: Preliminary figures show an annual savings of $60,000 in energy at The Trane Technology Center.

PHOTO: COURTESY OF THE TRANE CO.

Showcase: Carrier Corp.

For Syracuse, NY-based Carrier Corp., the EPA's ENERGY STAR Buildings program could not have come at a better time.

The chiller manufacturing company was an original Partner in the EPA's Green Lights program, and had developed an internal strategy of focusing on the environment through its manufacturing, packaging, and facilities management processes.

Simultaneously, the company saw the need to modernize its North American Operations Headquarters building, a 200,000-plus square foot facility housing research and administrative offices. "The ENERGY STAR [*Showcase*] Buildings program seemed like a tremendous opportunity for us to upgrade our facility, which had not been upgraded to any large degree since the 1950s. It had a variety of energy-draining problems," says Richard Fedrizzi, director of Environmental Marketing for Carrier, a division of United Technologies. Carrier also participates in other EPA voluntary green ventures, such as the ENERGY STAR Office Equipment program, and in manufacturing programs designed to trim energy use.

Lower photo: Finishing touches are put on the lobby at the Carrier Corp.'s Energy Star Showcase building.

PHOTO: COURTESY OF CARRIER CORP.

Although the data is still being compiled, Carrier is expecting to see a $142,000 cut in its annual power bill, thanks to the ENERGY STAR Buildings effort. In energy savings, that translates into an estimated 1.3 million kWh per year. Because the project was completed in December, more accurate savings figures will be calculated after a full heating/cooling season has been monitored.

The project began, of course, with the replacement of inefficient lighting. Single-pane windows were replaced with more energy-efficient models, and heating, ventilating, and air-conditioning (HVAC) controls were installed— a move which Fedrizzi says generated an estimated 55 percent of the cost savings, and an estimated 54 percent of the electricity savings. In addition, a chiller using R-11 was replaced with a new Carrier unit that relies upon hydrofluorocarbon (HFC)-134a, a non-ozone-depleting refrigerant. The unit is turbine-assisted, which enhances energy efficiency.

"The timing of the ENERGY STAR Buildings program was perfect for us," says Fedrizzi, whose company recognized an incredible 15.3 percent internal rate of return. Considered on an even broader scale, he lauds the ENERGY STAR effort for its impact. "The beauty of the program is that you can multiply savings times hundreds and maybe thousands of buildings across the country, and this produces billions of dollars of savings," he says, adding that the program also cuts pollution produced by electricity generation.

The *Showcase* program will continue to be an effective tool for convincing building owners across the country that energy-efficient technologies work, says Fedrizzi. "The largest hurdle most businesses have is to realize these savings will occur if changes are made. The EPA deserves a lot of credit for giving people the beginning of the proof they need. I think this program will spread like wildfire." ▶

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ENERGY STAR

Transformers

EPA POLLUTION PREVENTER

Every year, more than 2 percent of the electricity produced in the United States — or about 61 billion kWh — is lost because of transformer inefficiencies. That's an environmental concern, bearing in mind that generation of electricity creates 35 percent of U.S. carbon dioxide emissions, according to the EPA.

Transformers are essential to the delivery of electricity, converting voltage to a level safe for use in businesses and offices. To promote the development and purchase of energy-efficient transformers, the EPA has launched the ENERGY STAR Transformers program.

The nearly year-old, voluntary endeavor was kicked off by targeting utility companies, encouraging them to become Partners and agree to consider (and purchase) ENERGY STAR Transformers when cost-effective. About 10 percent of the electric utility industry (as represented by transformer sales) has joined the effort, says Scott Thigpen, manager of Utility Programs for the EPA's Atmospheric Pollution Prevention Division. And interest is growing. "We are getting calls from a lot of utility companies, asking about the program," he says. Transformer manufacturers are also participating. "About 90 percent of the transformer industry is ready to produce ENERGY STAR Transformers for anyone requesting them."

The project has a 2-pronged approach: One is geared toward utilities; the other, toward facilities owners and managers, who also purchase transformers for buildings. This component of the program is in the polishing stages. "We are now turning to the buildings and industrial market. We are working to develop technical analysis tools for facilities owners and managers, enabling them to quickly analyze multiple transformer bids and consider the payback if money is spent for the more efficient transformer," says Thigpen.

Competition within the electric utility industry may be good news for commercial and industrial buildings professionals. As options expand for customers, many utility companies are trying to add value to their services. As a result, shared savings approaches — whereby a utility company may produce some cash for a more efficient transformer, then share the energy savings cost with the customer — are likely to be more prevalent, Thigpen notes. "It's great for building owners, because they essentially put up no capital and still save on the energy bill," he says.

ENERGY STAR

Office Equipment

American consumers and companies pay a whopping $1.8 trillion per year to power office and home business equipment.

EPA POLLUTION PREVENTER

Incredibly, the EPA estimates that much of that power is wasted, and that energy use could be reduced dramatically.

The ENERGY STAR Office Equipment program is working toward that goal. The EPA and up to 90 percent of the leading office equipment manufacturers have joined forces to present consumers with the option of purchasing ENERGY STAR equipment. "We have worked with manufacturers to come up with a voluntary specification. Today, it is hard to find a manufacturer that is not producing ENERGY STAR equipment," says Jennifer Dolin, program manager for the ENERGY STAR Labeling program.

The ENERGY STAR[SM] logo can be found on personal computers, monitors, printers, copy machines, and facsimile machines. The devices "power down" when not in use, entering a sleep mode and consuming less electricity. There is no loss in performance, and the equipment "powers up" automatically when needed again. For example, says Dolin, a facsimile machine "sleeps" but "awakens" the instant an incoming call is received, and is activated to send outgoing documents by light beam sensors that detect when a fax is being loaded. Similarly, an energy-saving computer monitor typically rests when not used for a while, but reactivates within seconds when the mouse or keyboard is touched.

The federal government is the venture's largest participant; an executive order signed by President Bill Clinton several years ago requires the use of the efficient equipment, estimated to save taxpayers about $40 million annually in energy costs.

EPA figures estimate that a company with 100 personal computers, 20 printers, and 10 facsimile machines could save about $3,800 per year with ENERGY STAR equipment. Dolin offers this scenario:

On any given day, 75 percent of computers in an office are turned on; they typically run for nine hours, but are actually used only four hours. Thirty percent are left on overnight. "If all computers were turned off overnight, and power management devices were used during the day, 50 to 70 percent of the wasted energy could be captured." In limited situations, some computers must remain on overnight, she notes. ❑